



09475910.010300

Z(m)	d/D(Zf=0.3m)	d/D(Zf=1m)	d/D(Zf=10m)
0.1	0.4	0.47	0.49
0.2	0.1	0.21	0.24
0.4	0	0.078	0.12
0.6		0.035	0.078
1m			0.045
1.2m			0.037
1.5m			0.028
2m			0.022

FIG. 3A

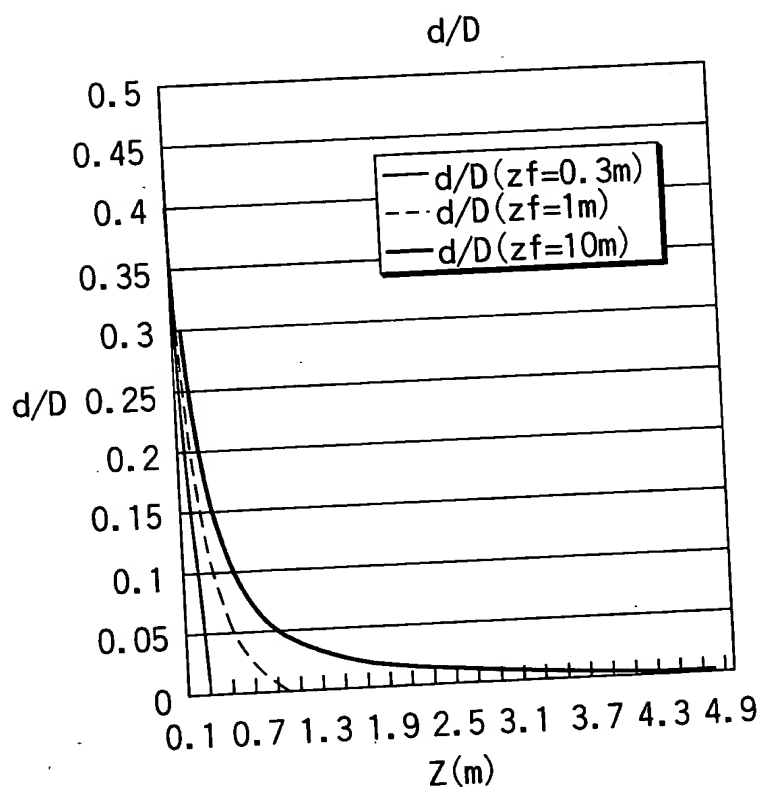


FIG. 3B

09476910 010300

Z(m)	d/D(Zf=0.3m)	d/D(Zf=0.6m)	d/D(Zf=2m)
0.2			
0.4	0.05		
0.6	0.10		
0.8	0.125	0.022	
1	0.140	0.363	
1.3	0.153	0.0489	
1.6	0.163	0.0570	
2.0	0.170	0.0630	
2.5	0.176	0.0690	0.0051
3	0.180	0.0727	0.0085

FIG. 4A

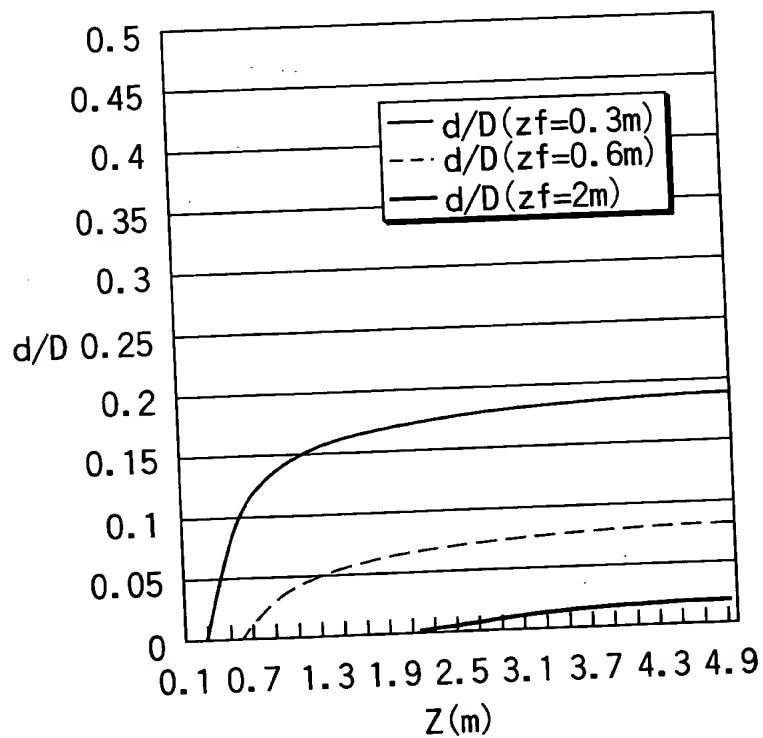


FIG. 4B

09476910.010300

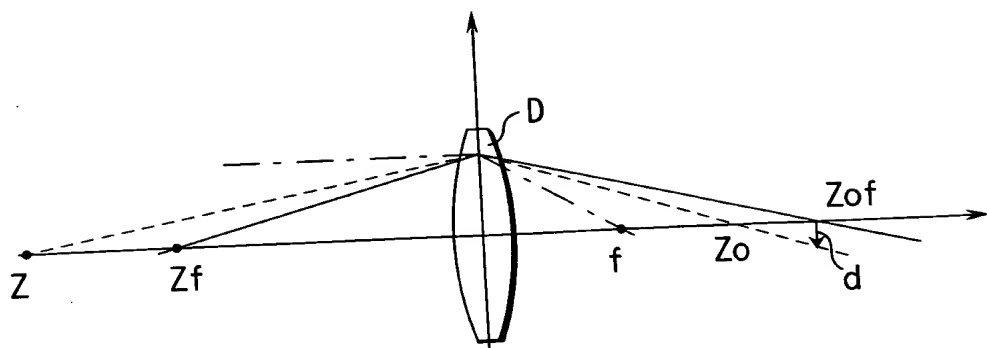


FIG. 5

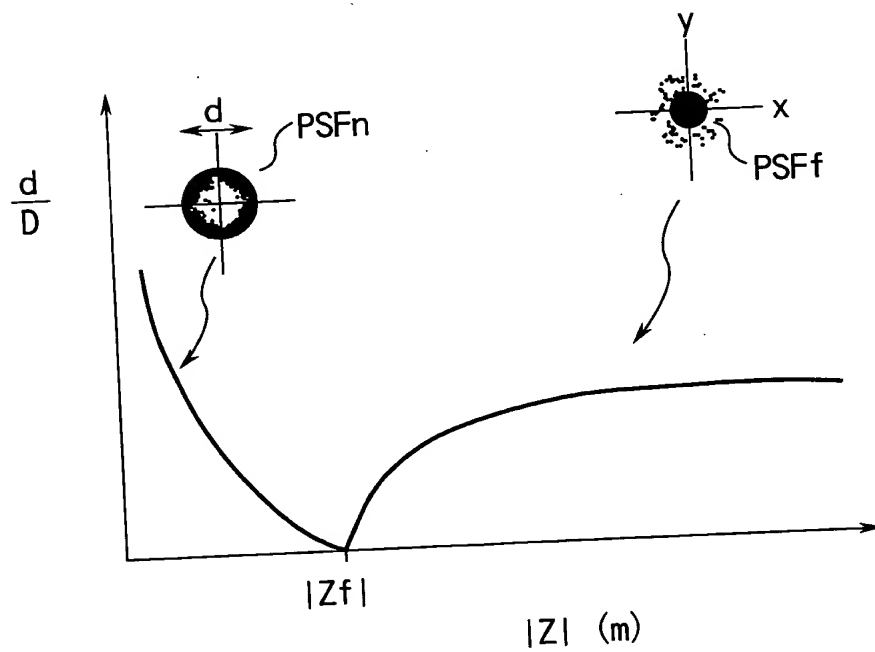


FIG. 6

The diagram illustrates a lens system with a lens centered at the origin of a horizontal axis. Key points on the axis are labeled  $Zf$ ,  $Z$ ,  $f$ ,  $Zfo$ , and  $Zo$ . Solid lines represent the paths of light rays originating from  $Zf$  and  $Zo$ . Dashed lines represent the paths of light rays originating from  $Z$ . Below the lens, a vertical axis is labeled  $r$  and  $0$ . A wavy line represents a spatial profile along this axis, with an arrow labeled  $g$  pointing to the right. To the right of the wavy line is a circular cross-section filled with a stippled pattern, representing a spatial distribution or intensity profile.

The figure consists of two parts. The top part is a schematic diagram of an optical system. It shows a lens with focal length  $f$ . The object plane is at distance  $Zf$  from the lens, and the image plane is at distance  $Zfo$  from the lens. The focal point is at distance  $f$  from the lens. The bottom part shows a coordinate system with  $x$ ,  $y$ , and  $r$  axes. A point source is located at the origin  $(0,0)$  of the  $x$ - $y$  plane. The  $r$  axis is perpendicular to the  $x$ - $y$  plane.

FIG. 7B

09476910.010300

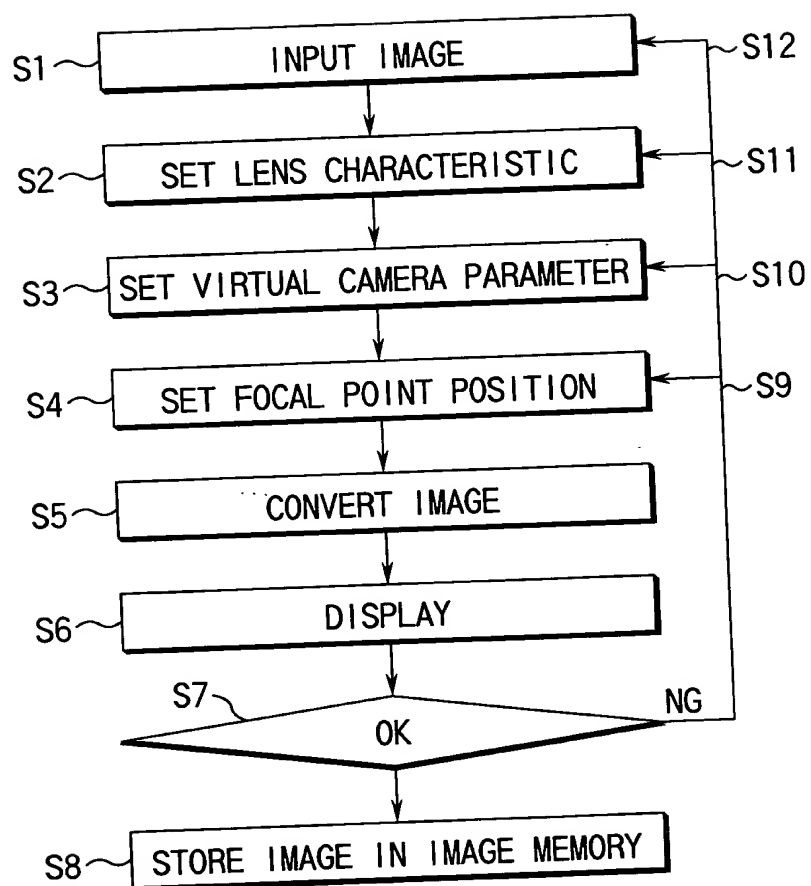
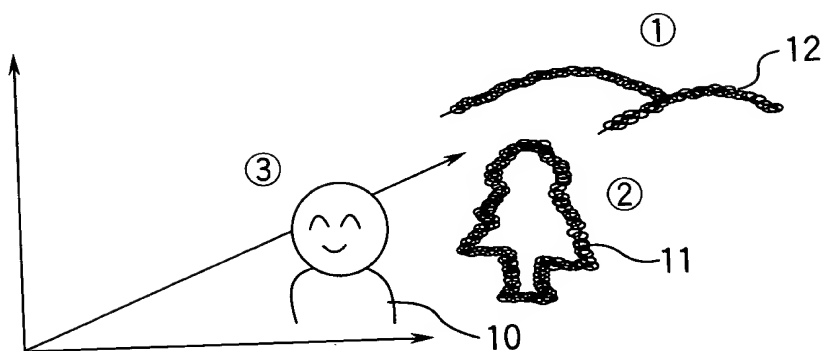
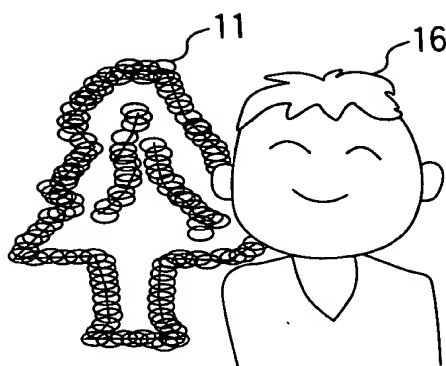


FIG. 8

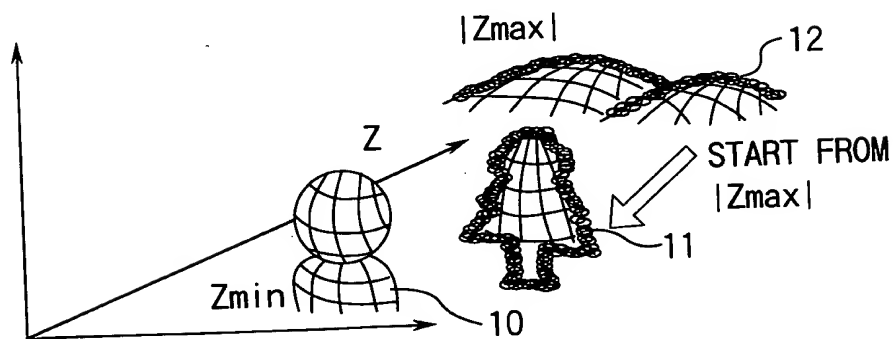
```
graph TD
    S11["R(x,y,z)  
G(x,y,z)  
B(x,y,z)"] -- "CONVERT INTO DISCRETE DATA" --> S12["Ri(xi,yi,z)  
Gi(xi,yi,z)  
Bi(xi,yi,z)"]
    S12 --> S15["START CALCULATION  
FOR EACH CELL"]
    S15 --> S13["CALCULATE d  
d1=D * (1/|Z| - 1/|Zf|) * |Z| < |Zf|  
d2=D * (1/|Zf| - 1/|Z|) * |Z| > |Zf|"]
    S13 --> S14["INPUT SET PARAMETER  
D, Zf, f"]
    S14 --> S13
    S13 --> S17["BLUR STATE AT POINT j BY Ri  
Rji(xj,yj) = Ri(xi,yi) * g(xi-xj,yi-yj)"]
    S17 --> S18["BLUR STATE AT POINT j BY ALL POINTS  
Rj(xj,yj) = Σ Ri(xi,yi) * g(xi-xj,yi-yj)"]
    S18 --> S19(["END"])
    S17 --> S15
```

The flowchart illustrates the process of blurring a color image. It begins with inputting the color components  $R(x,y,z)$ ,  $G(x,y,z)$ , and  $B(x,y,z)$  (S11). These are converted into discrete data  $R_i(x_i,y_i,z)$ ,  $G_i(x_i,y_i,z)$ , and  $B_i(x_i,y_i,z)$  (S12). The process then starts a calculation for each cell (S15). For each cell, it calculates a distance  $d$  (S13) based on the input set parameters  $D$ ,  $Z_f$ , and  $f$  (S14). The distance  $d$  is calculated as  $d_1 = D \left( \frac{1}{|Z|} - \frac{1}{|Z_f|} \right) |Z|$  for  $|Z| < |Z_f|$  and  $d_2 = D \left( \frac{1}{|Z_f|} - \frac{1}{|Z|} \right) |Z|$  for  $|Z| > |Z_f|$ . The blur state at point  $j$  is then determined by  $R_{ji}(x_j, y_j) = R_i(x_i, y_i) g(x_i - x_j, y_i - y_j)$  (S17). The blur state at point  $j$  is then determined by all points  $R_j(x_j, y_j) = \sum_i R_i(x_i, y_i) g(x_i - x_j, y_i - y_j)$  (S18). The process ends with the calculation using  $R$ ,  $G$ ,  $B$ ,  $g_a$ , and  $g_b$  (S19).

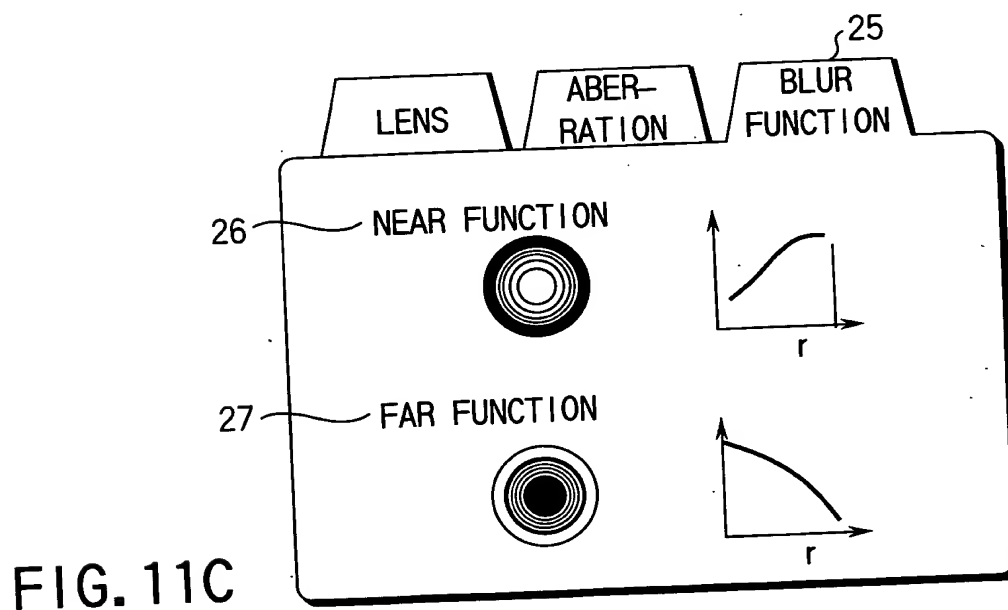
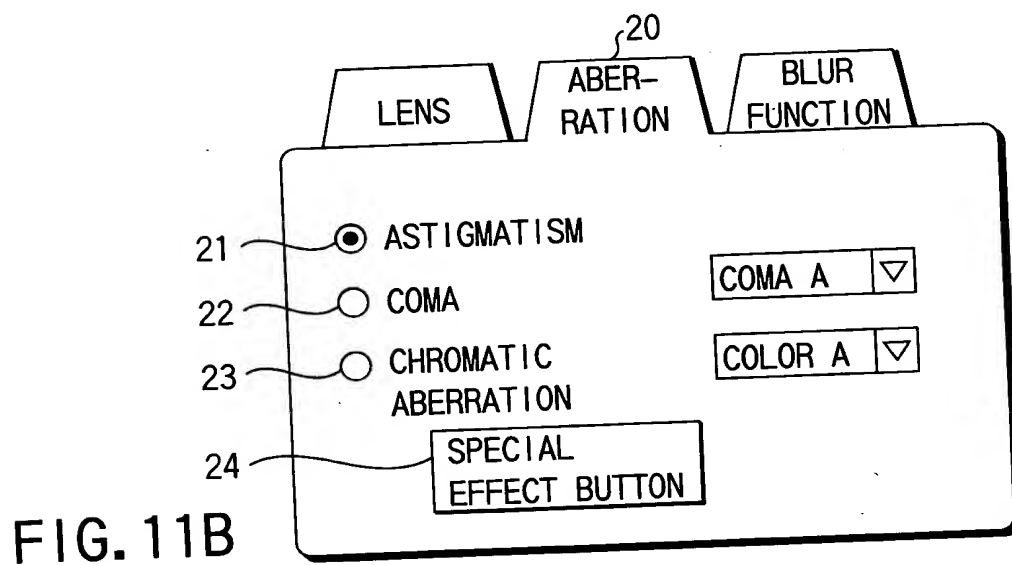
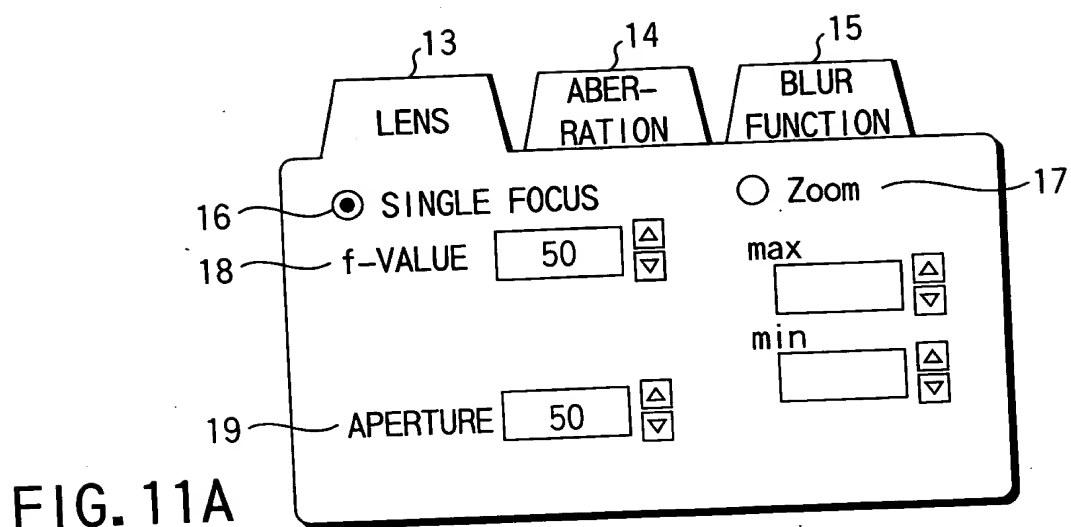
FIG. 9



PROCESSING FROM OBJECT HAVING  
LARGE  $|Z|$  IN UNITS OF OBJECTS







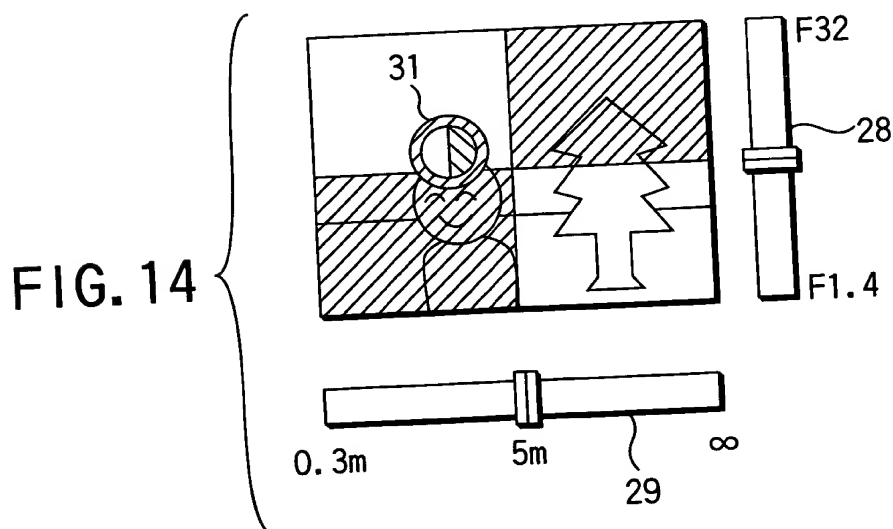
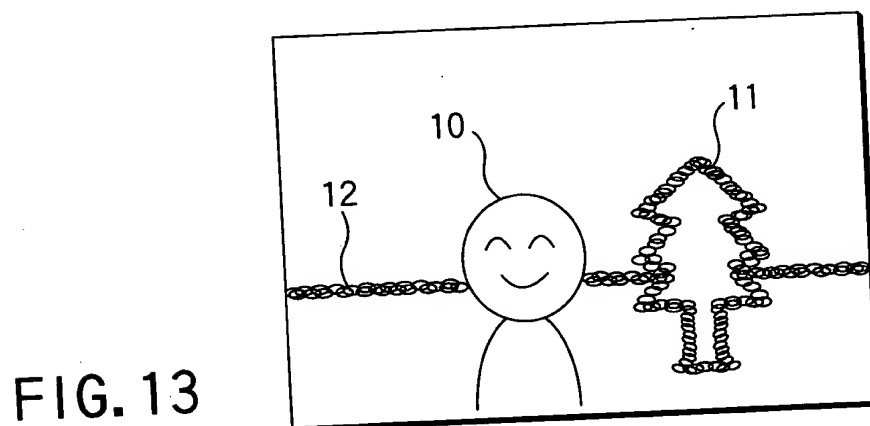
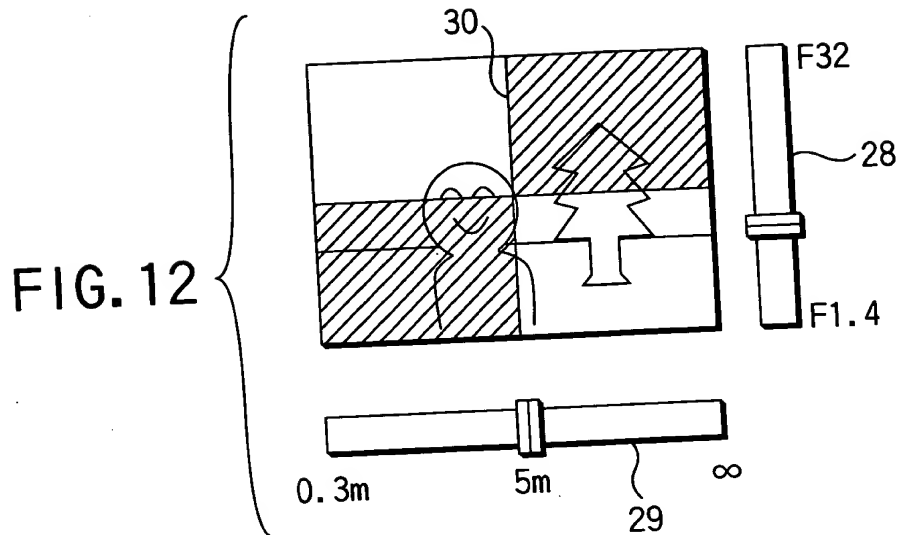




FIG. 18A

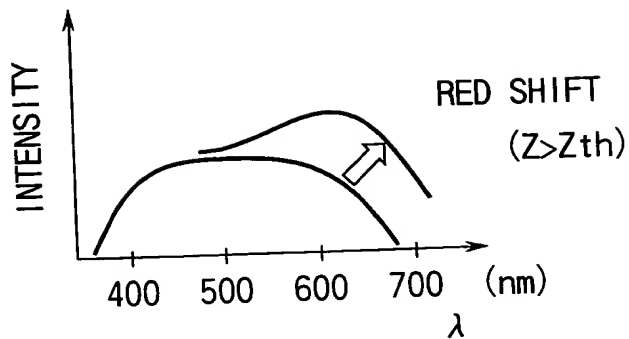


FIG. 18B

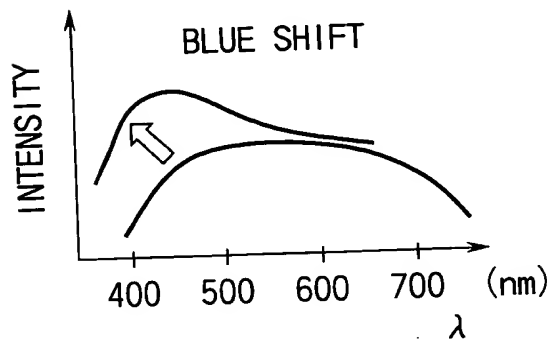


FIG. 19A

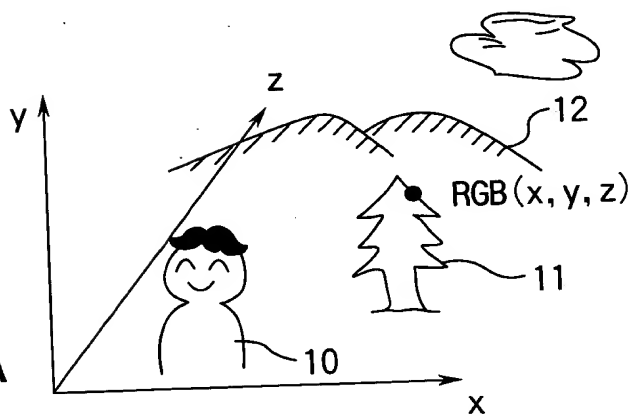


FIG. 19B

